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# INAUGURAL DISSERTATION

ON THE

## Suffocatio Stridula, or Croup,

WHICH, UNDER THE DIRECTION OF THE

REVEREND JOHN EWING, D. D.

PROVOST OF THE UNIVERSITY OF PENNSYLVANIA;

BY THE AUTHORITY OF THE

HONOURABLE BOARD OF TRUSTEES,

AND WITH THE APPROBATION OF THE

RESPECTABLE FACULTY;

IS SUBMITTED TO THEIR SUPERIOR JUDGMENTS, AND TO THE  
CANDID EXAMINATION OF THE LEARNED,

FOR A

DÈGREE OF DOCTOR OF MEDICINE.

By ROBERT G. W. DAVIDSON, A. M. OF PHILADELPHIA,

HONORARY MEMBER OF THE PHILADELPHIA MEDICAL SOCIETY.

19th Mar, 1794.

*Nec Via Mortis simplex*—

*Nec proli medicas adhibere manus abneget parens,*

*Aut fideat poscens meliora deos.*

VIRGIL.

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M,DCC,XCIV.



T O

ADAM KUHN, M. D.

PROFESSOR OF THE PRACTICE OF PHYSIC

IN THE

UNIVERSITY OF PENNSYLVANIA,

THIS DISSERTATION

IS INSCRIBED,

AS A SMALL MARK OF

RESPECT AND AFFECTION

FOR THE

MANY BENEFITS RECEIVED FROM HIS INSTRUCTIONS,

DURING THE STUDIES

OF HIS

FRIEND AND PUPIL,

THE AUTHOR.

19th May, 1794.

~~Philip G. Paine to the  
completeness of his friend~~

The Author

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# DISSERTATION, &c.

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**A**MONGST the disorders to which the human race are liable, there are few that require the attention of the medical world more than the subject of this dissertation. And, although it be a disease which is not so commonly under the notice of the Practitioner, yet it frequently occurs, and is then so deceitful in its approach, so quick and terrifying in its progress, and so very fatal in its termination, that it generally proves fatal before there is any suspicion of its nature or danger; and is usually so far advanced when discovered, as to be beyond the reach of medical assistance.

Of late years, Physicians have paid particular attention to this subject, but they differ widely with respect to its nature and treatment. I have, with diffidence, undertaken this subject, not with an expectation of offering any thing new, or making proselytes to the opinions that have been advanced respecting it; but rather with a desire of being useful, which I hope will fully compensate for the want of novelty.

Impressed with these sentiments, I have chosen a disease, upon which there are few accurate observations to be read, and concerning the nature of which, and its treatment, Physicians every where materially differ. I also hope, that by giving the generally received opinion of the Physicians in this place, and also the method of cure which is at present adopted by them, it will not be unworthy the perusal of the American reader: And, as it is absolutely necessary that a Thesis, on some medical subject, should be written by the Candidate for a degree in medicine in this University; these considerations taken together, but especially the last, will, I hope, sufficiently excuse my coming forward thus publicly, as an author, and, I presume, dispose the candid reader to overlook the many imperfections of this juvenile performance.

## DEFINITION OF THE DISEASE.

THE SUFFOCATIO STRIDULA, the disease which is the subject of the present Thesis, may be defined, to consist in a difficult respiration, and peculiar shrill noise in inspiration, without any appearance of inflammation or swelling in the fauces, and with a perfectly natural and easy deglutition.

Many, and very different have been the names assigned to this disease, by the different writers who have treated of it, and by the people in general in different parts of the world. Most of the writers have given it that name which they thought most expressive of their ideas, or that would comprise in it the most characteristic signs of the disease. Doctor Cullen, who considers it as an inflammatory affection of the trachea, calls it the CYNANCHE TRACHEALIS; by others it is called the ANGINA SUFFOCATORIA and CYNANCHE STRIDULA, including in these names, not only the idea they held of the nature of the disease, but likewise some symptoms, which they supposed highly characteristic of its effects. Doctor Michaelis, from the idea which he entertains of the disease being a true polypous concretion in the trachea, has given it the name of ANGINA POLYPOSA. Other writers on this subject have described it under other names. We have adopted the name given to it by Dr. Home, as being more expressive of its characteristic symptoms, and not immediately supporting any theory. Perhaps it would be more proper to call it the SUFFOCATIO TRACHEALIS—by this name we distinguish its seat particularly, and we omit the expression STRIDULA, which is not constant through the disease, for as we shall say hereafter the voice is sometimes entirely lost. The propriety or impropriety of these different names will appear hereafter, when we consider the different theories of Physicians.

In Scotland it is commonly known by the names of the CROUP, CHOCK or STUFFING; and in this city it is called the HIVES.

## HISTORY OF THE DISEASE.

IT has been generally supposed that this disease was unknown among the ancients. Dr. Home observes, that “there is little to be learned from enquiry, and still less from books.” It is true, that before he favoured the world with his most excellent treatise on this disease, and his dissections of those who had died of it, Physicians were ignorant of its nature; but that the disease was till then unknown, seems very improbable. Many circumstances in early times prevented its discovery. The age of the patient, from whom little could be learned—the slow and unalarming approach of the disease, from which circumstance the Physician was seldom called to visit the patient till it was too late; and, above all, the great aversion that people had to dissections, which alone

could have unfolded the nature of the disorder, were insurmountable difficulties. However, of late years, parents have been apprised of the danger of neglecting the complaints of children, and have applied to the Physician much sooner.

Their willingness also to submit to the opening of dead bodies, which shews their progress from the superstitious notions of the ancients to a more enlightened æra, have furnished opportunities to the modern Physician for obtaining that knowledge of the disease by dissections, which was much wanted, and which it is hoped will one day put a stop to its dreadful ravages, by establishing a sure and certain method of cure.

In support of the opinion I have advanced, I beg leave to quote two or three passages from the ancients. Hippocrates in his Aphorisms, speaking of the diseases of the throat and fauces, has the following words: "*Ex anginis, gravissimæ sunt, et celerime interrimunt, quæ neque in faucibus, neque in cervice quidquam conspicuum faciunt.*" Galen in his commentary on the Aphorisms of Hippocrates, where he is speaking of the Asthma, as a disease particularly incident to children, has an observation so applicable to the Suffocatio Stridula, that I am induced to believe he must have confounded the two together. His words are, "*Jam vero fit ob angustiam eorum quæ sunt in pulmone ventriculorum. Hæc vero angustia fit, repleto viscere ab iis quæ desuper veniunt defluxionibus. Nam et ex utero ad aerem ambientem transitus, & alimenti mutatio eos omnes imbecilles reddit, si ad hæc etiam fluxiones ad pulmonem accesserint nequaquam sustinere possint.*"

That the Suffocatio Stridula has been often confounded with the Asthma Infantum, will not appear strange when it is observed, that Dr. Millar expressly says, that the disease described by Dr. Home is exactly like the second stage of the disease which he calls the spasmodic Asthma of children, and therefore it is probable, that other writers may have fallen into the same mistake.

Michaelis insists upon it, that no cases of this disease are to be found earlier than the time of Tulpius, who, he says, has described one case of it in a taylor, who threw up, by coughing, pieces of a white thick smooth membrane. This case, however, is so very short and imperfect, that it is impossible to determine upon it. Besides, the ejecting of pieces of a membrane, cannot be said to be a proof of the presence of the disease; because this takes place in other disorders of the mouth and fauces, and also in cases of a Polypus in the Trachea\*.

Michaelis dates the first account we have of this disease from the case mentioned by Tulpius; and then mentions several Physicians who have seen and described it before Dr. Home published his treatise. He particularly notices an Italian Physician by name

\* See Medical Transactions, Vol. I. and Michaelis, page 126.

Ghisi, who saw the disease prevailing as an epidemic, and described it very accurately. At Upsal, in the year 1764, a graduate, by name Wilcke, published a dissertation, in which he gives one or two cases of this disease, but confounds it very much with the Scarlatina. About the same time, a piece on the disease appeared in the Act. N. Nat. Curios. by Dr. a Bergen; and in the year following Dr. Home published his Enquiry\*.

I have mentioned the account given by Michaelis, and traced what could be known of it down to Dr. Home, not only to shew how wrong some people have been in calling it a new disease; but also to shew, that from its being known so much earlier than was generally thought, there is reason to suppose that no fixed period can be assigned to its existence.

The Suffocatio Stridula is frequently an epidemic disease. It is peculiar to no country, and is generally met with in low wet and marshy places; and those near the sea, or other large bodies of water. Dr. Crawford mentions a very particular fact, respecting a place in which it prevailed. He says it was very common in a wide plain, called the *Carse of Gowrie*, which is stretched along the river *Tay*, in *Scotland*. This plain has lately been dried up, since which time the disease is rarely met with in that place.

It is not, however, confined to these places, for Dr's. Cullen and Rosen von Rosenstein mention its appearing in midland countries, and those far distant from the sea. It appears, generally, in Autumn, especially if the weather be moist, in the Spring, Summer and Winter, only when the weather is damp.

Dr. Rosen von Rosenstein is the only writer who considers this disease as contagious. Of this, however, he can produce but a solitary instance, and, as he has evidently confounded the disease with the ulcerous sore throat, we cannot from thence deduce its contagious nature. Besides, there are instances of children living *eodem hypocausto*, with a child sick in the disease, without their being affected by it.

Children are generally the subjects of this malady. Grown persons are, however, sometimes attacked by it. Dr. Kuhn, in his lectures, mentions an instance of a person upwards of 40 years of age, being attacked with all the symptoms of the disease, and cured by the usual remedies†.

With a few exceptions of its attacking grown persons, the disease is said to be peculiar to children from the time they leave the breast till the twelfth year of their age, though it seldom attacks those above seven or eight years old. I can, for my own part, see no reason why it should not attack at any period during infancy,

\* See Michaelis de Angina Polyposa five membranacea, page 5.

† See also Ghisi, and if the case mentioned by Tulpius is to be considered as an instance of the disorder, it will further support the truth of this observation.

and I entertain no doubt but that it does. Children's complaints are not easily known, and it would be almost impossible to discover this disease in an infant, when there is so little pain or difficulty of swallowing, unless the symptoms were very strongly marked. If children were able to make known their complaints at so early an age, I have no doubt, we would meet with many cases of the disease during the first year of their existence.

Dr. Sauer, in a letter to Dr. Michaelis, giving an account of the disease as it appeared epidemic at Wertheim, has the following words in support of what has just been said. "*Infantes plurimos hoc morbo correptos vidi, qui materno adhuc alebantur lacte.*"

Children of a full and gross habit of body, who are of a lively disposition, and apparently enjoy the best health, are particularly liable to the disease. In general, it is slow in its attack, though it sometimes comes on suddenly. The child appears languid, droops, and becomes drowsy and heavy, refuses to join in any of its usual amusements, and becomes sad and peevish. There is a slight degree of hoarseness, the presence of which symptom frequently misleads parents into the opinion that the child has only caught cold, and, on this account, they seldom apply for assistance at that period. This is one reason why the disease proves so fatal. There is, however, very little or no cough, and when present, it is short and stifling, and less convulsive than the catarrhal cough, and is attended with little or no expectoration. Deglutition is never affected.

The child grows warmer than usual, the tongue is covered with a white mucus, the pulse is quick and hard, and if the child is able to express its feelings, it presently complains of a dull sensation (seldom, if ever, of an acute pain) at the head of the trachea. The anterior part of the neck, answering to the upper part of the trachea, swells a little, and is painful when pressed; but this pain is never acute. The disease makes its appearance in this way, for the first two or three days, gradually becoming more alarming. The face is sometimes red and swelled, though it is more frequently overspread with a deadly paleness, or is of a livid colour. At times, the patient is thirsty, and affected with sickness at stomach and headach; and the urine is with or without sediment. These four last symptoms are adventitious circumstances, and by no means constant attendants.

The breathing, though but little impaired in the beginning, soon becomes more quick, difficult and laborious, seeming to threaten instant suffocation. To prevent this, the shoulders are raised, and the muscles of the abdomen contracted with great force, in order to dilate the thorax. There is no apparent cause for this difficult respiration, or the other symptoms. On looking into the fauces, we observe nothing worthy of remark, or different from what is natural, except, that in some cases they have appear-

ed somewhat shining, or covered with a tough white mucus. Joined with, and accompanying this difficult, and, for the most part, deep respiration, there is a change or total loss of the voice, attended with a peculiar shrill noise on inspiration, which has been likened to the crowing of a young cock\*. It is difficult to describe it, though easily known by a person who has once heard it. Sometimes this noise attends each inspiration—at other times, it is only perceived when the child cries, coughs or calls out. The skin becomes dry, the body is costive, and the belly swelled. In some patients, the hands and feet swell, the tonsils sometimes, though seldom, and even then not to any high degree.

In some cases these symptoms encrease very fast, and often to such a height, that a disease, which, a few hours before, seemed to require no medicine, is now frequently beyond all means of relief. The difficult breathing and anxiety are so great, that suffocation is expected every moment. The pulse becomes quick, small and irregular, and sometimes intermitting; a cold sweat breaks out upon the face and neck, and often over the whole body.

This period of the disease is frequently attended with a vomiting and a violent coughing; both of which have sometimes thrown up a large quantity of a tough white mucus, or pieces of a hollow membranous concretion exactly resembling the figure of the trachea or bronchizæ. In consequence of this evacuation, the respiration is very much relieved, all the symptoms seem to be changed for the better, and frequently, if all, or a large portion of the membrane is ejected, the patient is relieved of all his complaints, and regains his former health; but the natural tone of the voice is seldom recovered for many months†. If, however, a great part of the tough mucus or membrane remains, or when ejected is very soon reproduced, all the symptoms grow worse, and the patient, who, a short time before, was thought out of danger, is suddenly carried off in a fit of suffocation, or quietly sinks into the arms of death.

During all this time, the child appears easy, owing, probably, to the absence of pain; and retains its senses and reason to the last. It has even been supposed, that the strength of the mind is increased, and that a preternatural judgment has been discovered before death.

I should also observe, that, very often, all the symptoms suddenly remit, and put on a more favorable appearance, without any evident cause, or even the evacuation of the mucus or membrane,

\* Michaelis says it resembles the noise made by a young hen more than any thing he knows. Other writers compare it to the noise of a hen when frightened; and others to the barking of a dog or fox.

† I had an opportunity, not long since, of seeing a very striking instance of a recovery of this sort, and had part of the membrane in my possession for some days.

which we have just mentioned; and which we shall say hereafter, has been found in the trachea, by dissection after death. When this remission happens, the respiration is freer, and becomes in a manner natural; and the child is able to rise out of bed and walk about the room. These remissions, however, continue but a short time; the disease receives, as it were, a new spring; the symptoms return with redoubled violence, and the child is suddenly suffocated. Others are taken off in a slower manner—the symptoms gradually increasing, respiration becoming difficult and laborious, the pulse weaker, more frequent, intermitting and tremulous. This last termination of the disease is rare. Other symptoms may occasionally attend; but then they are by no means fixed, or certain. The disease may likewise be combined with other disorders, particularly a catarrh, when the symptoms of each will be blended together.

There is no fixed time for the disease to finish its course, whether the patient dies or is cured—many have died on the third or fourth day, and not a few on the second. The succeeding days however, are by no means without danger. An instance is mentioned by Hallenius, of its proving fatal on the eighteenth day. Many are saved after the third or fourth day, and even longer periods—in adults the disease lasts much longer; and in the *Act. Nat. Curios.* there is an account of a boy, twelve years of age, who recovered, by throwing up the membrane, after the disease had continued five weeks. A child that has once had the disease, is, nevertheless, liable to future attacks of it.

To compleat the history of the disease, which has just been given, we shall give an account of what has appeared in those who have died of the disease, on

## DISSECTION.

THE external appearance of the body resembles that of persons who have died of suffocation. The face is swelled and livid, the eyes are prominent and turgid with blood, the veins of the neck are swelled, and sometimes the anterior part of the neck is red and tumid with blood. The fauces are free from every appearance of inflammation or other affection, according to most authors. Sometimes the glands at the root of the tongue are swelled; the mouths of their excretory ducts are much distended, and the parts surrounding the glottis are covered with a white tough mucus.

In the thorax the lungs were, in most cases, found of an healthy appearance and sound: In some, they were tinged with a red colour and turgid with a great quantity of blood.

On laying open the trachea, we discover a great quantity of a tough white mucus, or a hollow membrane with similar qualities putting on the appearance of the internal surface of the trachea.

When the membrane is found, there is always a quantity of mucus lying between it and the trachea, which prevents it from adhering to the inner membrane. Sometimes it has been found fixed to the lower part of the trachea, and in attempting to take it out has been lacerated—Ghisi says that in one instance it resisted even the knife. Dr. Home has kept it macerating in water for many days without dissolving it. This membrane has been found so long as to stretch down from the top of the larynx into the small ramifications of the bronchiæ; sometimes it extends no farther than the bronchiæ; and frequently only two or three inches from the upper part of the trachea. In some cases, it is not thicker than writing paper; in others, it is so thick as nearly to stop up the wind-pipe.

The mucus is found in the trachea and bronchiæ and may be squeezed out in great quantity from the lungs, by pressure.

The inner surface of the trachea, in general, shews no signs of inflammation. In most of the dissections made by the physicians in this place, no marks of inflammation were discovered\*. Dr. Home frequently observes that “no signs of inflammation” were to be seen.

In addition to what has just been said, I beg leave to give the following quotation from Dr. Home. “The seat of this disease appears to be the cavity of the wind-pipe. The place first and most particularly affected is the upper part of the trachea about an inch below the glottis; for, in that part, they complain of a dull pain; the external swelling has been observed there; and the morbid membrane we have found stretching from that place downwards. The back part of the trachea, where there are no cartilages, seems from the inspection of those that die of this disease, to be its first and principal seat, as this morbid membrane is often found there, when it is in no other part. No wonder that the morbid appearances are chiefly found there; for there are lodged the greatest number of glands, designed for the secretion of mucus.”

## DIAGNOSIS.

IN the beginning of this dissertation we took notice of the frequent mistakes committed by parents in supposing that the first appearance of this disease is a simple CATARRH or COLD; physicians unfortunately fall into the same error; and it will be found very difficult, in the beginning, to make a distinction. However, in the Suffocatio Stridula, there is frequently no cough, and when it is present, it is short and stifled; and not so convulsive as the catarrhal.

\* See Dr. Kuhn's lectures.

Dr. B. Duffield, a practitioner of eminence in physick, and lecturer on midwifery, in Philadelphia, informs me, that he has made many dissections, all of which bear testimony to the absence of inflammation. See also Sparman's translation of Rosen Von Rosenstine, on the Diseases of Children.

When the peculiar shrill voice, and laborious respiration take place, the difficulty of distinguishing vanishes. Extraneous bodies falling into the trachea, have produced symptoms exactly similar to those of this disease. In such cases the pain at the head of the trachea will be acute and not a dull sensation as in the hives. If the pain changes its place in coughing, it will assist in forming a diagnosis. We should enquire too, whether the child has been in a situation to get any thing into its trachea that might stick there and give the symptoms peculiar to this disease.

Another disorder with which this has been confounded is a spasmodic disease of the lungs, to which children are liable and which is totally different from the disorder under consideration. As this has given rise to various disputes among physicians, I shall beg leave to spend some time upon it, and endeavour to prove from the symptoms, treatment and termination of this disease, that it is not of a spasmodic nature.

**SPASMODIC DISORDERS** of the lungs come on suddenly and generally at night; they go off quickly and are attended with considerable remissions or intermissions, which leave the patient free from all complaints. The suffocatio stridula or hives comes on gradually, and is two or three days before it arrives to any considerable height. It is attended with very little remission or intermission and even then, the patient is not entirely freed from the shrill noise, difficult respiration, &c. until all the obstruction in the trachea is removed. The voice suffers no change in spasmodic diseases: in the hives it is considered as the *Pathognomonic* symptom. Spasmodic disorders are periodical in their attacks, and are accompanied with an evacuation of pale limpid urine: circumstances which do not take place in the hives. In the spasmodic asthma, the pulse is quick, small, irregular, and contracted. In the hives it is hard and quick in the beginning, and becomes weak, feeble and irregular towards the close. Dr. Millar says, that the spasmodic asthma is sometimes attended with a train of nervous symptoms; such as involuntary crying and laughing, delirium, subsultus tendinum, &c. and that a slight delirium was observed in most cases. These symptoms never appear in the hives.

During the paroxysm of a spasmodic constriction of the lungs, there is no secretion of mucus, but as soon as this takes place, the constriction is removed. In the suffocatio stridula, there is a discharge of mucus from the trachea, which may be distinctly heard rattling in it. When part of the membrane is thrown up there can be no doubt of the nature of the disease; as no membrane has ever been discovered in those who died of the spasmodic asthma.

The want of irritability in the inner membrane of the trachea seems to oppose the idea of its being owing to spasm. Bleeding, blistering, and antispasmodics are the remedies most successful in spasmodic diseases; but are useless, and rather hurtful in the hives.

Spasmodic disorders seldom prove fatal on the first attack ; whereas the hives are generally so.

Michaelis has confounded this disease with a true POLYPOUS CONCRETION in the trachea. It is therefore necessary that we should know how to distinguish such affections. These may be known by their coming on very gradually, and being generally attended with a slight cough, and sense of irritation in the trachea, many months before they shew signs of any great obstruction to the respiration : or when they come on quicker, they are preceded by inflammation of the parts, and the effusion of serum, or of blood into the bronchiæ or air vessels of the lungs.\*

### REMOTE CAUSES.

These are generally divided into predisposing and exciting or occasional ; according to which division we shall consider them. From what has been already delivered on the history of the disease, it appears that its predisposing causes are a certain period of life, viz. INFANCY ; a particular habit of body, namely, A GROSS AND FULL HABIT ; and lastly, a peculiar state of the weather, such as A WET AND MOIST ATMOSPHERE, attended with cold.

The reason why *children* are most liable to the hives seems to be owing to the redundancy of fluids, with which they are furnished, in order to supply the necessary nourishment to their growing solids. This redundancy of humours is found in every young animal, and is demonstrated from the gelatinous state of all their solids. Children, moreover, are in general the subjects of several diseases, which have a great effect in weakening the organs of respiration, and to which grown persons are less obnoxious ; viz. measles, catarrh, chin-cough, &c. Children of a gross full habit of body, as abounding more in this redundancy of humours, must be the particular subjects of this complaint. Another reason may be, that children are more apt to neglect, or are less able to throw up this tough mucus, when secreted in a large quantity, than adults.

A *wet and moist atmosphere* produces a general relaxation of the whole system, and is universally observed to have a great effect in producing affections of the breast. In the present case we suppose its effects to be particularly exerted on the organs of respiration and adjacent parts. And that this cause conduces to the formation of the disease, appears from the time in which it is most prevalent, and the places where it is most commonly met with ; in some of which it is said to be almost *endemic*.†

A situation near the sea is also considered as favourable to attacks of this disease. This may act in two ways ; first, by the moisture which is imparted to the air by the exhalations from the sea.

\* Nec raro post Hæmoptyses observantur, unde eos ex sanguine consilari verosimilimum evadit. P. 29.

† See the fact mentioned by Dr. Crawford respecting the plain called the Carse of Gowrie, and quoted above.

2dly. By the saline impregnations\* which it derives from the same source, stimulating the glands of the trachea, and causing them to secrete a greater quantity of mucus than usual.

The occasional causes are whatever debilitates and relaxes or stimulates the mouths of the glands in the trachea, and causes them to secrete a greater quantity than usual of that mucus which is constantly secreted to moisten it in health. Hence this disease is frequently seen to come on after those diseases which have a tendency to weaken those parts. e. g. measles, chin-cough, catarrh, &c. This is also proved by analogy. A Lucorrhœa is produced from a relaxation of the glands of the vagina, and a gleet is the consequence of a relaxation of those of the urethra. And even when the stomach is weak or relaxed, a quantity of tough mucus is poured forth from its glands.

Another exciting cause is cold, which, by suppressing the perspiration, determines the fluids to the internal parts. When this takes place, different parts are affected by the determination; but why one part should be affected in preference to another we are unable to conjecture. In the present case, we suppose the fluids to be determined to the glands of the trachea, in consequence of which, a greater secretion of mucus takes place. Perhaps cold may act by stimulating the glands, and thus produce the disease.

#### PROXIMATE CAUSE.

WHILE physicians were unacquainted with the appearances on dissection, they had no idea of what was going forward in the trachea; nor could they form a just idea of the disease. But when Dr. Home favoured the world with his very valuable dissections; the nature of the disease was evident, and its cause clearly discovered.

By the information we have derived from dissections and from the history of the disease and its causes as treated of above; we shall endeavour to lay down a Proximate cause, which it is presumed will be perfectly satisfactory. This we suppose to consist in a preternatural secretion of a tough, white and thick mucus from the glands in the trachea. To this some have added the presence of the membrane before mentioned, but this is an effect and depends upon the duration of the disease. Children that have died suddenly, and have been opened after death, shewed no appearance of membrane, but the trachea and bronchiæ were full of mucus.

When a child is exposed to the remote causes, they produce a preternatural secretion of that mucus, which is designed by nature to line the trachea, and defend its tender coats from irritation; and if the patient is unable from age, or weakness of the parts, to spit it up, the disease is produced. While the mucus is poured

\* It is a fact generally received, that the air on the sea shore imparts an evident saline taste to the tongue. This is accounted for, from the common salt in the sea being swept along with the moisture and mixed with the air. See Home's enquiry into the croup.—Page 40.

cut from the glands, its thinner and more aqueous parts are carried off partly by absorption,\* and partly by the air in respiration, and its remaining parts are formed into a thick tough membranous substance. While these circumstances take place, the secretion is still going on and increases the thickness of the membrane at the same time that it prevents it from adhering to the trachea.

This account of the production of the membrane is plausible and I expect, on examination will be found to be the true one. But as Michaelis entertains a different idea, supposing it to be a true polypus of the trachea†; it will be proper to take some notice of his opinion. The matter discharged from the trachea and lungs by coughing or hawking, during the whole course of this disease has all the properties of mucus. "This fluid is separated from glandular bodies, deposited betwixt the different membranes, which are perforated by an infinite number of almost imperceptible holes, that give a passage to the excretory ducts of those glands‡." The membrane, as was before observed, is generally found at the upper and back part of the trachea where the glands are numerous, and no where else. The glands too at the root of the tongue and their excretory ducts have been found enlarged: all which clearly shew, that the glands are principally affected and that the secretion of mucus from them must have a great share in producing the disease. The appearance of the membrane does not oppose this opinion, as all writers agree, that mucus is capable by stagnation of becoming hardened into a tough membranous or crust like appearance§. Dr. Rush observes, "that were the passages of the nose less in our reach, it is probable, that a membrane resembling that found in the trachea would be found in it every 24 hours||."

Polypous concretions of the trachea are generally solid: but the membrane in those who died of this disease was always found tubular.

Michaelis says polypous concretions of the trachea putrify very easily, but that mucus does not. Dr. Home says, that this preternatural membrane did not dissolve, though purposely kept for many days, in warm water; now this we know is one of the first appearances of putrefaction, laying aside the probability that so accurate an observer as Dr. Home would have taken notice of any appearance of putrefaction had it been discovered.

If this membrane was formed, as he supposes, entirely from the coagulable lymph, we should have stronger marks of inflammation attending the disease—or, even granting that inflammation is an

\* See Haller's physiology, vol. I. chap. vii. sec. 229.

† *Mihi singulare illud respirationis impedimentum, verus asperae arteriae polypus esse videtur.* Page 23.

‡ Home. Page 35.

§ Haller's Physiology. Chap. VIII. sect. 190.

|| Letter to Dr. Millar. Page 16.

attendant on it, why don't we meet with large quantities of pus and a fetor of the breath, for, as Dr. Home has justly observed; there cannot be a fitter situation for its formation?—See also the diagnosis.

In the last paragraph we hinted at an opinion that prevails, respecting the disease being of an inflammatory nature; and, though the contrary seems from the history of the disease, and the dissections to be clearly proved, we will trespass a little longer on the patience of the reader, particularly as Dr. Cullen and most of the European authors are of a different way of thinking. To constitute this, an inflammatory disease, the usual phænomena of inflammation should present themselves. On looking into the fauces, however, there is *no appearance of inflammation or other affection*: The sensation at the head of the trachea is a dull, not an acute pain; and the external swelling corresponding to it, is not inflamed, but appears from a dissection made by Mr. Wardrobe and communicated to Dr. Home to be rather œdematous than inflammatory. The deglutition is not affected; and though they consider it as an inflammation of the inner membrane of the larynx and trachea, there is no cough, acute pain, very strong pulse, or feverish symptoms: Nor is the disease followed by the usual terminations of inflammation. In support of some of these assertions, I shall beg leave to quote some authorities. The history of the disease, as given by writers to which I refer the reader, will prove many of them. Dr. Home, speaking of the opinions of physicians on this disease, says, “Had these muscles, (*viz.* of the glottis) or any of the coats of the trachea been inflamed, or mortified, as others have thought, the pain would have been greater than it is before the mortification, and the pulse would have been stronger than it generally is, as the parts are membranous\*.” Dr. Home has been quoted as saying, that the trachea appears inflamed on dissection, but this quotation conveys a different opinion: Besides, in most of his dissections, he says there was no inflammation of the trachea to be seen, nor any disorder of the lungs. And we have the authority of Michaelis to say, that the buffy appearance of the blood is very rarely to be met with.

With regard to the disease being attended with fever. In addition to what was said in the history of the symptoms, we observe, that Dr. Sauer, in his account of the disease as it prevailed at Wertheim, says, “*Febris initio nulla.*” Michaelis observes, that the disease was seldom attended with fever, and that when it was present, at the beginning, it was so slight as to be perceived with difficulty†.

If what has been said is not alone sufficient to prove the absence of inflammation in the hives, the appearances on dissection

\* Home, page 37.

† Michaelis, page 88.

should place the matter beyond a doubt: In confirmation of what was said on that subject, we will add the following authorities: Dr. Rosen von Rosenstein takes notice of the case of one child opened by a Professor Martin, and of three others, communicated to him by a surgeon at Fahlun, by name Shulz; in all the four cases the membrane was found, but there was no appearance of inflammation in the lungs or trachea, they being quite found. And Dr. Kuhn, who was present at the dissection of several persons who had died of the disease in this city, declares that he never saw the least appearance of inflammation in the trachea\*. A very strong argument in favour of the proximate cause we have adopted, and very much against Dr. Cullen's theory of the disease is, that upon the ejection of the mucus or membrane, the disease is removed, and the patient recovers†. This would not be the case if the disease depended on inflammation. The method of cure which is found to be most successful in this disease, will likewise be a means of proving that it does not depend on inflammation.

### RATIO SYMPTOMATUM.

HAVING thus endeavoured to establish a proximate cause, we are next to see if it will account for the symptoms. The hoarseness and change of the voice depend upon the presence of the mucus in the trachea obstructing the glottis. As the secretion increases, it becomes more obstructed, and the voice is shrill. When the trachea is filled with mucus, and the glottis totally obstructed, the voice is entirely lost, and the intermediate changes will depend on the greater or less obstruction given to the passage of the air through the glottis. In the case described by Mr. Balfour, and communicated to Dr. Home, of a child who had died of all the symptoms of this disease, which was occasioned by a piece of a shell lodged in the trachea; the shrillness of the voice was particularly noticed.

The following case, in many respects similar to the foregoing, is mentioned from its being attended with a favourable termination.

In the month of March 1785, Hartman Kuhn, the eldest son of the Professor of that name, when between thirteen and fourteen months old, put an English six-pence into his mouth, in the presence of his mother, who concluded he had swallowed it. Some time after, he was frequently attacked with a wheezing and difficulty of breathing exactly resembling the symptoms of the suffocatio stridula, but as they generally continued only a short time, and came on when he was heated by exercise, or other causes, less attention was paid than the immediate symptoms appeared to require and it was conjectured they were occasioned by teething, as

\* Dr. Kuhn's manuscript lectures.

† A case of this kind is related by Dr. Shippen.

he was then cutting his dentes canini. In the month of August he was attacked with a regular intermittent fever, in the course of which he took several antimonial emetics, some laxatives and the Peruvian bark which removed his fever, but the *wheezing* and *difficulty of breathing* continued as usual. In the month of September he was unexpectedly attacked with a most violent fit of coughing, which terminated in great exertions to vomit, and in one of these violent efforts of coughing and retching at the same time, he threw up a large quantity of mucus accompanied with some blood and the English six-pence which he had put into his mouth upwards of *six months* before, and which during that period, must have been lodged in the upper part of the trachea. His voice was not affected with hoarseness or any alteration; which circumstance was the principal reason that the wheezing and difficulty of breathing did not excite any apprehensions of immediate danger from those symptoms; although at one time the child was supposed by an experienced physician to labour under the croup.—The subject of the foregoing case is now a fine hearty boy and free from *every complaint*.

On this case I cannot help remarking, how fortunate it was for the child that his parents had no suspicion of the presence or situation of the piece of money; as it is more than probable such efforts would have been made for its removal as of themselves might have proved fatal. And we may conclude, that it is very possible a physician's ignorance of the cause of a complaint may in some instances be the fortunate means of his patient's safety. The favourable termination of this case will, at least, point out the impropriety of a too quick recourse to violent measures in similar circumstances.

The total absence of pain is owing to the presence of mucus lining the trachea, and defending it from irritation—When the membrane is present, there is always a quantity of mucus found between it and the trachea, which prevents its causing any irritation—besides, as the membrane is formed from the mucus, and very gradually, the trachea will become used to any irritating quality it may be supposed to possess; and, in a short time will be quite insensible to it. The laborious breathing is a necessary consequence of the obstruction in the trachea; and the difficult passage of the air through it. The increased respiration and change of colour which take place in the face, are owing to the difficult passage of the blood through the lungs, occasioned by the same cause, preventing the necessary quantity of air from being taken into them.

### P R O G N O S I S.

THIS disease comes on with symptoms so trifling in appearance, and so much resembling the attack of a slight cold, that it is seldom discovered in time. It is also so quick in its termination,

that it frequently proves fatal, before we are aware of the danger. For these reasons, it has justly been considered as a very fatal disease. The younger the patient, the greater is the danger, and the longer the disease has continued, before assistance has been procured, the less chance of a recovery.

Physicians have considered the disease as being divided into two stages. The first is reckoned from the beginning of the disease, to the formation of the membrane; the period after this is called the second stage; and is considered as extremely dangerous.

If we are called to the patient in the course of the first twenty-four hours, and find the breathing not very laborious, the anxiety not very great, the pulse firm and hard, the face but little changed, and the voice altered only in crying, coughing or hallooing; we may entertain hopes of a favourable termination. On the other hand, if we do not see the patient before the third or fourth day, at which time the membrane is supposed to be formed; and the reverse of the favourable symptoms has taken place; such as a laborious, difficult respiration, soft, quick and irregular pulse, the face swelled, and of a livid or leaden colour, great restlessness and anxiety, the voice low and scarcely to be perceived, attended with the shrill noise which is peculiar to the disease; the worst consequences are to be expected. Desperate however as this latter case may appear, some have recovered from it; by a critical cough or vomiting supervening, and ejecting the mucus or membrane.

The first signs of a favourable event are the cough becoming stronger and moist, accompanied with the symptoms that attend moist lungs.

### METHOD OF CURE.

THIS, it is plain, must be adapted to the two different stages of the disease which we have just mentioned. Before we lay down the Indications to be pursued in the treatment of the suffocatio stridula we will spend a few minutes in the consideration of a remedy that has been and is still used in the cure of it, namely BLOOD-LETTING. This remedy must have been recommended from the idea generally entertained of the disease being of an inflammatory nature, and in this intention would have been very proper: but if the theory of the disease and the proximate cause we have endeavoured to establish is a just one; this remedy must certainly be improper and will prove injurious by the debility it induces in the system.

In many of the cases related by authors, bleeding was used and yet many of the patients died; although in some cases blood was taken away on the first day. Bleeding will always relieve the symptoms for the present, and it is probable that this effect has in some degree led to a freer use of it; but the symptoms are apt to return soon after and with greater violence than before; and the

pulse instead of being hard, becomes small, quick and weak. The pulse will sometimes sink immediately after bleeding; we should therefore be always on our guard in ordering it. Sometimes the disease is combined with symptoms of catarrh or the angina inflammatoria, in which cases, bleeding may be of service; but even in these, it may be omitted and give place to other evacuations, particularly *Purging*.

In a plethoric habit, however, it may be proper to take away a small quantity, to relieve the difficulty of breathing and favour the transmission of the blood through the lungs, and so prevent a sudden suffocation; but that it has any effect in removing the proximate cause or curing the disease we utterly deny.

The method of cure we will consider under the three following Indications.

1. To prevent a too great secretion of mucus into the trachea.
2. To remove the mucus when in a very large quantity or when it has been formed into a membrane, and
3. To guard against a return of the disease.

The first indication is chiefly suited to its beginning or forming state. To answer this indication BLEEDING, BLISTERING, DIAPHORETICS, PURGATIVES, &c. have been recommended. Of BLEEDING we have already spoken.

BLISTERS are another remedy. They should always be used in the first stage and are to be applied round the neck. By the evacuation they produce, they relieve the congestion in the trachea—they give a new determination to the flux of the humours, and by emptying the absorbent vessels they increase their power, and thereby cause a greater absorption of the mucus.

The STEAMS of hot water and vinegar drawn in with the breath are highly recommended by Dr. Home in this stage. He supposes they act by dissolving the mucus and preventing its concretion; and observes that the patient always spat a great deal after it, and that the lungs appeared moister.—Another remedy recommended with a view of evacuating the mucus lodged in the trachea, is VOMITING.—In the beginning of the disease it is certainly hurtful; for besides the debilitating effect it has on the system, it determines the fluids upwards and will increase the secretion it was meant to remove. Besides they seldom answer the intention for which they are given. But, should they have the intended effect, and the mucus be ejected, the determination of the fluids upwards and the debility induced, will increase the secretion of mucus nearly as fast as it is evacuated.—From which it appears that in the beginning of the disease they are far from being useful and can never be considered as a certain cure.

DIAPHORETICS, as they determine the fluids from the internal parts to the superficies, are very useful; they are particularly indicated in those cases where the perspiration is suppressed. Dr. Brown,

a physician in the late Continental Army, a man of respectability and eminence in his profession, placed his whole dependance for a cure, in exciting and supporting a gentle diaphoresis by Antimonials, and confining his patients during the course of the disease to a close room, to prevent any bad effects from exposure to the external air. The removal of the patient from the operation of remote causes is always desirable, and it is probable, that confinement to a close room might have some effect this way, and that dry, warm air, may act in some peculiar manner on the secretion of mucus in the trachea. With the same view, the WARM BATH is recommended and used with very beneficial effects. Diaphoretics are best given combined with PURGATIVES.

Keeping the bowels constantly open is generally recommended, and for this purpose, gentle laxatives of the cooling neutral salts have been administered: but the stimulating cathartics seem to be more proper, as our intention is not merely to evacuate the intestines, but to produce a greater secretion from the glands of the bowels, into their cavity. For this purpose, no medicine seems to have a better effect than CALOMEL, which is now considered as the only radical cure (if we may be allowed the expression) and on which we place our principal dependance. When this medicine can be had, it will almost supercede the use of any other remedy in the first stage of the disorder. Calomel is suited to every stage of the disease but it is most effectual in the first. In what manner this medicine produces its good effects, is now to be considered—It possesses a purgative quality, is very insoluble, an universal stimulus and has a peculiar action on the glandular system, in preference to any other. Its use as a purgative we have mentioned; from its insolubility, stimulus and peculiar action on the glandular system, it will stimulate the glands through the whole tract of the *primæ viæ*, *ab ore ad anum* and produce a very plentiful secretion of mucus into the fauces, œsophagus, stomach and intestines: in consequence of which the secretion of the mucus in the trachea will be lessened, and the humours determined to the cavities just mentioned.

Calomel to be of service must be given in very large doses, and these frequently repeated. The following case taken from Dr. Kuhn's lectures on the practice of physic, will point out its efficacy, and shew in what quantities it may be given, "On the third day of the disease he was called to visit a child, the only one of a gentleman in this city, to whom a variety of medicines had been given to no effect; vomits, pediluvia, blisters and bleeding, had by no means been neglected. Calomel was then proposed and given, and though the child was about ten months old, it took twenty grains of calomel in sixteen hours, and, by this means, was snatched from the jaws of death—In all human probability it must have been suffocated in twenty-four hours, had not this method been pursued." In

addition to this he observes, " That when called in at an earlier period he has in several cases given it with equal success; though the disease had not arrived at it's second stage and the membrane was not formed." I shall dismiss the subject of calomel with the following expression of another professor. " The bark is scarcely a more certain remedy for intermittents, than calomel, when thus administered, is, in this species of cynanche\*.

The only remedies, besides the one last mentioned, suited to the second indication are the exciting of VOMITING or COUGHING, although we do not approve of vomiting in the beginning of the disease, yet when the mucus is in great quantity in the trachea and seems to threaten suffocation, or when the membrane is formed, vomiting may be very useful; accordingly we have instances of it's evacuating the mucus or membrane and thereby completing a cure or else by exciting a cough which has had the same effect.†

Although vomiting has sometimes produced this desirable effect, yet it seldom succeeds and at best is but a doubtful remedy. But as it is incumbent on us to do all in our power for the recovery of our patient, we should neglect nothing that has ever been serviceable or that might possibly relieve him. To excite vomiting, tartar emetic, in large doses, is recommended.

It has frequently happened that a spontaneous COUGHING coming on, has ejected the membrane and removed the disease. Several cases of this kind are related by authors, and one, not long since fell under my own notice. But unfortunately, we are seldom able to copy nature in this salutary exertion—The trachea is so insensible, in this disease, that nothing seems capable of exciting it into action. Steams received into the mouth are recommended, and fumes have been tried, but without effect.

The fumes of the capsicum or piper guineensis may be tried, as they are found to excite a cough sooner than any thing else.

When every thing that has been recommended fails, and there are no hopes of the patient's recovery; the last and only remedy we can have recourse to is TRACHEOTOMY. This will not afford relief unless the membrane is extracted; but when we reflect that this lies loose and floating as it were in the trachea, it seems probable that it would be no difficult task.—The operation was performed once in this city, by a gentleman eminent in physic and surgery, but without success; this solitary instance should not deter us from other trials and while there is the least probability of its being successful, we ought to attempt it. The operation is seldom recommended before every other remedy has been tried in vain and the patient is supposed to be incurable. In such a case the hazard of the operation is much more commendable, than consigning the patient to his fate, without this last though doubtful chance. When.

\* Dr. Rush's Observations and Enquiries, Vol. I. page 124.

† See the case related by Dr. Shippen in his Lectures.

ever the membrane is evacuated, no matter by what means, it will be proper to continue the Calomel for some time or until the patient is perfectly recovered.

To answer our third indication or to prevent a return of the disease, the remote causes must be carefully avoided or guarded against--- For this purpose, the patient should be removed into a warmer and drier situation, where he can have the advantages of a pure, dry and temperate air ; and perhaps the method practised by Dr. Brown would be serviceable in this case : He should avoid wet and cold, and should guard against the effects of sudden changes of the weather, by good warm cloathing. But if any symptoms of the disease should return, we must have immediate recourse to the remedies mentioned in the first indication, particularly diaphoretics and purgatives---above all, calomel : To this we may add a small quantity of tartar emetic, in order to produce a gentle determination to the surface. The calomel must be given in doses to move the bowels and is to be continued until all the symptoms vanish. TONICS will likewise be of service, particularly in those cases where the disease has been preceded by the chincough, measles, &c. which were observed to have a great influence in promoting the disease.

The preparations of steel, peruvian bark and the cold bath, are remedies which should not be omitted.

Where the disease seems disposed to return frequently, a SETON, or ISSUE, in the neck, and continued for some time, seems likely, to be of service.

“ I shall only add, upon the subject of this disorder, that instances of its mortality have been very rare, in Philadelphia, since the general use of the remedies which have been mentioned\*.”

† Dr. Rush's Observations and Enquiries, Vol. 1. page 125.





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